



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/541,222	07/01/2005	Soichiro Kawakami	03500.000345.	4982
5514 7590 12/08/2009 FITZPATRICK CELLA HARPER & SCINTO 1290 Avenue of the Americas NEW YORK, NY 10104-3800				
EXAMINER				
HAN, KWANG S				
ART UNIT		PAPER NUMBER		
1795				
MAIL DATE		DELIVERY MODE		
12/08/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/541,222

Applicant(s)

KAWAKAMI ET AL.

Examiner

Kwang Han

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 September 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,5,7-9,11-13 and 15-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,5,7-9,11-13 and 15-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB06)
Paper No(s)/Mail Date 4/7/09, 6/30/09
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ ~~Notes of Informal Patent Application~~
- 6) ☐ Other: _____

**ELECTRODE MATERIAL FOR LITHIUM SECONDARY BATTERY AND ELECTRODE
STRUCTURE HAVING THE ELECTRODE MATERIAL**

Examiner: K. Han SN: 10/541,222 Art Unit: 1795 December 8, 2009

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 28, 2009 has been entered. Claim 14 was cancelled. Claims 1, 13, and 15 were amended. Claims 20-22 were added.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claims 1, 5, 7-9, 11-13, and 15-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1, the terms "fine" and "thin" are relative terms and it is unclear as to what the Applicant regards as the invention. Applicant is asked to clarify.

Dependent claims have been rejected for the same.

Claim Rejections - 35 USC § 102

5. The claim rejections under 35 U.S.C. 102(b) as being anticipated by Idota et al. on claims 1, 5, 7-8, and 13-18 are withdrawn, because the independent claim 1 has been amended and claim 14 has been cancelled.

Claim Rejections - 35 USC § 103

6. The claim rejection under 35 U.S.C. 103(a) as unpatentable over Idota et al. as applied to claim 1 and further in view of Suzuki et al. on claims 9, 11, and 12 are withdrawn, because independent claim 1 has been amended.

7. The claim rejection under 35 U.S.C. 103(a) as unpatentable over Idota et al. as applied to claim 18 and further in view of Nakanishi et al. on claim 19 is withdrawn, because independent claim 1 has been amended.

8. Claims 1, 5, 7-9, 11-13, and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Idota et al. (US 6235427) in view of Suzuki et al. (US 2002/0146623) and Kasashima et al. (US 6322926).

Regarding claim 1, Idota is directed towards an electrode material for a lithium secondary battery comprised of particles of a solid state silicon alloy in a preferable particle size range of 0.005 to 0.5 microns (2:26-32), having an amorphous material (2:13-25) including alkaline earth metals, transitions metals, or semi-metals (1:47-60; 3:4-20) composed of silicon and two or more elements including tin, gallium, aluminum,

silver, zinc, and titanium (3:16-27), a ratio of the alloying metals other than silicon to be between 5 to 2000% by weight (3:21-27), and where the solid state alloy is a solid solution (3:9-10) with the alloy undergoing reactions on cooling (3:12-14). The alloy would inherently be mixed in a melted liquid state (single liquid phase) before the cooling occurs. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature *is necessarily present in that which is described in the reference*. In re Robertson, 49 USPQ2d 1949 (1999). Idota is silent towards the particles of the alloy to be covered with an oxide film and one element selected from boron, yttrium, or zirconium.

Suzuki teaches a lithium secondary battery with a silicon material electrode which contains doped boron [0069] in the amount of 0.1 to 50 wt. % (0.1 wt% silicon would have an atomic ratio of approximately 0.0026 relative to silicon) for the benefit of providing improved capacity loss and fine cycle properties while retaining a large discharge capacity [0015, 0016]. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a silicon based electrode which contains doped boron for lithium secondary material because Suzuki teaches it provides for improved capacity loss and fine cycle properties while retaining a large discharge capacity. It has been held that where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (MPEP 2144.05)

Kasashima teaches a powder material for a battery which is subjected to a dry surface treatment on the alloy material to form a very thin oxide film to impart corrosion resistance (6:3-12). It would have been obvious to one of ordinary skill in the art at the time of the invention to apply a thin oxide film on the alloy material of Idota and Suzuki because Kasashima teaches an oxide film on the alloy particles allows for increased corrosion resistance.

Regarding claim 5, Idota discloses an alloy composed of silicon and two or more elements including tin, gallium, aluminum, silver, zinc, and titanium (3:16-27).

Regarding claims 7 and 8, Idota discloses the alloy containing a eutectic including eutectics formed from silicon and an element selected from tin, gallium, aluminum, silver, zinc, and titanium (3:4-27).

Regarding claims 9, 11, and 12, the teachings of Idota as discussed above are herein incorporated. Idota is silent as to the electrode material being doped with boron.

Suzuki teaches a lithium secondary battery with a silicon material electrode which contains doped boron [0069] in the amount of 0.1 to 50 wt. % (0.1 wt% silicon would have an atomic ratio of approximately 0.0026 relative to silicon) for the benefit of providing improved capacity loss and fine cycle properties while retaining a large discharge capacity [0015, 0016]. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a silicon based electrode which contains doped boron for lithium secondary material because Suzuki teaches it provides for improved capacity loss and fine cycle properties while retaining a large discharge capacity.

Regarding claim 13, Idota discloses particles of the silicon alloy having a preferable average particle diameter range of 0.001 to 5 μm .

Regarding claims 15 and 17, Idota discloses the material for the electrode comprised of a mixture of silicon alloy and a carbonaceous material which is employed as a conducting agent (7:49-53).

Regarding claim 16, Idota discloses an electrode structure which includes a conductive agent, a binder, and a current collector (2:3-13).

Regarding claim 18, Idota discloses a positive electrode active material capable of intercalating and deintercalating lithium and the negative electrode material capable of intercalating and deintercalating lithium (1:50-60). A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature *is necessarily present in that which is described in the reference*. In re Robertson, 49 USPQ2d 1949 (1999).

9. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Idota et al., Suzuki et al., and Kasashima et al. as applied to claim 18 above and further in view of Nakanishi et al. (WO 2001/41249 using US 6723472 for translation and citation).

Regarding claim 19, the teachings of Idota, Suzuki, and Kasashima as discussed above are herein incorporated. Idota discloses the positive electrode being a lithium-transition metal complex oxide (Abstract) but is silent towards this material comprising yttrium or yttrium and zirconium.

Nakanishi teaches a lithium secondary battery which positive electrode materials containing elements from Groups IIIB and IVB of the periodic table (i.e. yttrium, zirconium) for the benefit of forming a battery with high rate and low-temperature characteristics because addition of these elements causes change in the surface state of the active material to increase the surface area (1:50-59; 5:10-25). It would have been obvious to one of ordinary skill in the art at the time of the invention to use elements including yttrium and zirconium in the positive electrode because Nakanishi teaches it provides positive electrodes for batteries having high-rate and low-temperature characteristics.

10. Claims 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Idota et al. (US 6235427).

Regarding claim 20, Idota is directed towards an electrode material for a lithium secondary battery comprised of particles of a solid state silicon alloy having an amorphous material (2:13-25) including alkaline earth metals, transitions metals, or semi-metals (1:47-60; 3:4-20) composed of silicon and two or more elements including tin, gallium, aluminum, silver, zinc, titanium (3:16-27), and more specifically a Si-Ag-Sn alloy (29:41-54) and Si-Ag-Sn alloy (23:46-24:10), a ratio of the alloying metals other than silicon to be between 5 to 2000% by weight (3:21-27), and where the solid state alloy is a solid solution (3:9-10) with the alloy undergoing reactions on cooling (3:12-14). The alloy would inherently be mixed in a melted liquid state (single liquid phase) before the cooling occurs. A reference which is silent about a claimed invention's features is

inherently anticipatory if the missing feature *is necessarily present in that which is described in the reference*. In re Robertson, 49 USPQ2d 1949 (1999). Idota further discloses the composition of the alloy affects the electrical conductivity, discharge capacity, high rate characteristics, and cycle life (3:21-34) teaching the composition as a result effective variable. It would have been obvious to one of ordinary skill in the art at the time of the invention to vary the ratio of the elements in the alloy since it has been held that discovering the optimum range for a result effective variable such as composition involves only routine skill in the art in the absence of showing of criticality in the claimed range (MPEP 2144.05) In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 21, Idota discloses an electrode structure which includes a conductive agent, a binder, and a current collector (2:3-13).

Regarding claim 22, Idota discloses a positive electrode active material capable of intercalating and deintercalating lithium and the negative electrode material capable of intercalating and deintercalating lithium (1:50-60). A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature *is necessarily present in that which is described in the reference*. In re Robertson, 49 USPQ2d 1949 (1999).

Response to Arguments

11. Applicant's arguments with respect to claims 1, 5, 7-9, and 11-19 have been considered but are moot in view of the new ground(s) of rejection.

Contact/Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kwang Han whose telephone number is (571) 270-5264. The examiner can normally be reached on Monday through Friday 8:00am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. H./
Examiner, Art Unit 1795

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1795